

AUSTRALASIAN CERATOPOGONIDAE (DIPTERA, NEMATOCERA).

PART V.* THE PALPOMYIA GROUP OF GENERA.

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(With Plate v and 20 Text-figures.)

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INTRODUCTION.

Some 22 generic names have, at one time or another, been used for species included in this group. Of these, twelve are recognized as valuable by Macfie (1940), the rest being relegated to synonymy. Of the available genera I have recognized species belonging to only six in the material available to me for study. These are *Palpomyia*, *Clinohlelea*, *Xenohlelea*, *Johannsenomyia*, *Dicrohlelea*, and *Heteromyia*. As far as I have been able to check, the species which I have assigned to each of these genera conform fairly closely to their respective genotypes and all species run to the genus within which they have been included in Macfie's key, with the exception of those included in *Heteromyia*. Nevertheless the generic circumscriptions cannot yet be considered stable and changes may eventually be necessary.

In the following pages will be found a fairly detailed description of the characters of the genus *Palpomyia* and brief statements of the way in which the other genera may be differentiated from *Palpomyia*. It will be seen that the differences are rather more arbitrary than is desirable in generic segregations, but until a detailed study of a group, correlated with regional distributions, has been undertaken, it will remain impossible to do more than separate species in the most convenient way possible, without regard to natural affinities. Hence it should be realised that when genera are defined by their outstanding points of difference from another better known genus, it does not necessarily mean that they agree in all points not specifically mentioned, but only that they are otherwise similar in most respects.

The *Palpomyia* group comprises some of the largest species of Ceratopogonidae, and are all apparently predatory forms.

Genus PALPOMYIA Megerle.

MEGERLE VON NUELSELD, J. G., in MEIGEN, J. W., 1818.—"Systematische bekannten europäischen zweiflügeligen Insecten", 1: 35 and 65 (not seen).

GOETGHEBUER, M., 1920.—*Mem. Mus. Hist. Nat. Belg.*, 8, fasc. 3: 77.

EDWARDS, F. W., 1926.—*Trans. ent. Soc. Lond.*, 1926: 416.

Synonymy: *Apogon* Rondani, C., 1856. "Dipterologiae Italicae prodromus", 1 (not seen, fide Macfie, 1940). *Alasion* Rondani, C., 1857. "Dipterologiae Italicae prodromus", 2 (not seen, fide Macfie, 1940). *Heteromyia* Say of Kieffer 1926 in part but not *Heteromyia* Say of Macfie 1940.

GENERIC CHARACTERS.

The genus *Palpomyia* comprises species of usually moderate to large size with slender, almost bare bodies. The eyes are bare and separated, the palpi slender and the third segment not enlarged. The female antennae have segments 3-10 oval with sparse verticils, and 11-15 cylindrical and considerably elongated. The plumes of the male antennae are sometimes inconspicuous. In many species the scutum bears a small tubercle or spine at the middle of the anterior border and the surface is clothed

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with fine hairs only. The lateral piece of the scutum is broad, the posterior pronotal plate large and including the prothoracic spiracle and the pleura are almost entirely chitinized, the anepisternal cleft being narrow and oblique. The femora of the fore-legs are more or less thickened and with at least a few spines on the undersurface, those of the posterior legs are slender, sometimes with a few fine spines. The fourth tarsal segment is cordiform or bilobed beneath but unarmed, the fifth may be bare or with a few slender, curved, pointed spines and the claws are equal, of moderate size and with or without a small tooth on the inner side near the base. The wings are relatively long and narrow, with fine microtrichia but without macrotrichia. The costa extends to at least two-thirds of the wing length, both radial cells are well formed, the second being much longer than the first. There is no intercalary fork, the media is broadly sessile and r-m is vertical or nearly so. In many species the female abdomen has a pair of eversible glands between segments VII and VIII and usually similar pairs of glands between some of the other segments as well. When these glands are present the corresponding tergites have pairs of long, spinelike internal projections from their anterior margins (seen only in cleared specimens). The male hypopygium is partially or completely inverted. The ninth tergite is rather small, the cerci are well developed and the harpes are usually fused into a single median structure with rounded tip but may occasionally be divided distally.

Records of the Genus Palpomyia in the Australasian Region.

Although Kieffer described two species in the genus *Palpomyia*, these have been put by me into other genera. One, *bifasciata*, is now in *Clinohoelea*, and the other, *imparunguis*, was renamed *australiensis* by Kieffer, and placed in genus *Mirohoelea*, which is here regarded as a synonym of *Xenohoelea*. Strictly, then, the genus has not previously been recorded from Australia or New Guinea, although a number of species correctly assigned to *Palpomyia* have been described from New Zealand.

Apart from the two species described as new below, one from Tasmania, the other from Canberra, there are also included in the material lodged in the C.S.I.R. Museum a few specimens which proved inadequate for description but which extend the known range of the genus in the region. A series from Tullamore, New South Wales (ix:1946, D. H. Colless), come close to *P. subalpina*, but are rather too shrivelled for exact determination, and a single specimen of what is almost certainly a new species comes from Sogeri, Papua (31:v:1947, D. J. Lee).

Key to Australasian Species of Palpomyia.

1. Legs with dark markings on apices of femora and tibiae. (Fore femora much swollen with 15-18 spines; gland rods of female abdomen poorly developed but present on tergites VI and VII) *urpicifemoris* I. & M.
Femora and tibiae otherwise marked 2
2. Fore femora with dark band at middle (fore femora swollen with 15-20 spines; gland rods well developed at least on tergites V-VII) *cantauris* Macfie
Fore femora not darkest at middle 3
3. No anterior tubercle (fore femora only slightly swollen with 10 spines; gland rods absent) *decima* n. sp.
Anterior tubercle present 4
4. Legs almost uniformly yellowish brown. (Fore femora a little swollen with 10 spines; gland rods present on tergites III-VII) *rastellifer* Macfie
Legs darker brown, particularly hind tibiae 5
5. Fore tibiae lighter than those of the four posterior legs. (Fore femora a little swollen with about 13 spines in the female; gland rods present on tergites V-VII.) *nelsoni* Macfie
Fore tibiae dark brown. (Fore femora swollen with about 15 spines; gland rods absent.) *subalpina* n. sp.

PALPOMYIA DECIMA, n. sp.

Types: Holotype ♀, allotype ♂ and three female paratypes in the C.S.I.R. Museum.

Type Locality: Geeveston, Tasmania (7:xii:1922, A. Tonnoir for holotype, 6:xii:1922 for allotype and two paratypes, 8:xii:1922 for the third paratype).

DISTINCTIVE CHARACTERS.

The absence of any gland rods in the female abdomen distinguishes this species from any which have previously been described and legitimately belong in this genus

(only those described from New Zealand by Ingram and Macfie, 1931 and Macfie 1932). Other characters differentiating it from *P. subalpina* are detailed under that species.

DESCRIPTION.

(See Table 1 for measurements.)

Female.

Head: The head is very dark brown, almost black, with the eyes rather widely separated. The antennae are dark brown with segments 4-10 ovate and the last five elongated. The mouthparts are short, less than half the height of the head.

Thorax: This is almost black with brown pubescent hairs on scutum and scutellum, the latter with three border bristles on each side. There is no anterior tubercle and the halteres are dark brown.

Legs: These are as dark as the body but with the tarsi slightly lighter and reddish. The fore femora (Text-fig. 1) are only slightly swollen with a group of ten spines beneath on the distal half. The fourth tarsal segments are cordate and the claws are small, equal and with a basal angle (Text-fig. 2).

Wings: Macrotrichia are absent but fine microtrichia are present over the wing surface, just visible at a magnification of 60 \times . The area of membrane encompassed by the costa, the base of M to r-m and R₄₊₅ is brownish. The venation is shown in the photograph in Plate v, fig. 1. The two lower (posterior) sides of the first radial cell are distinctly unequal and the cell thus approaches a parallelogram in shape.

Abdomen: This is dark brown. No gland rods are present and there are two subequal spermathecae.

Male.

This sex is generally somewhat lighter in colour. The antennae are lighter brown with long dark brown verticels on segments 2-9. The legs are light brown and the fore femora are slightly swollen and spinose beneath on the distal half.

Genitalia (see Text-fig. 3): The coxites are simple with the style rather short and tapering. The phallosome is a simple inverted V-shaped organ and the harpes are paired, elongated clubs. The ninth sternite is large and broad, bluntly rounded apically and covering as a definite chitinous flap the greater part of the rest of the terminalia.

Distribution: Apart from the type series I have examined, a further specimen from Eaglehawk Neck, Tasmania (6:xi:1922, A. Tonnoir).

PALPOMYIA SUBALPINA, n. sp.

Types: Holotype ♀ and two female paratypes in the C.S.I.R. Museum.

Type Locality: Blundell's, Australian Capital Territory (7:i:1930, A. Tonnoir).

DISTINCTIVE CHARACTERS.

This species is very similar to *P. decima* but is slightly larger, with the fore femora a little more swollen and with more spinules. A minute anterior tubercle is present and the first radial cell of the wing is distinctly triangular.

DESCRIPTION.

(See Table 1 for measurements.)

Female.

Head: This is black and shining with the eyes rather widely separated. The pedicels of the antennae are black and the flagellum dark brown; the basal flagellar segments (4-9) are about twice as long as broad and segment 3 is twice the length of 4; segment 10 is a little longer than the preceding flagellar segments and 11-15 are considerably elongated. The clypeus is black and prominent and the mouthparts are scarcely half the height of the head.

Thorax: The thorax is entirely black and shining with scutum and scutellum clothed with pubescent hairs. A minute anterior tubercle is present and the halteres are very dark with black knobs.

Legs: The mid and hind femora and tibiae, the fore tibiae and the third to fifth tarsal segments of all legs are dark brown, the rest of the legs being a lighter, yellowish

brown. The fore femora are distinctly, but not excessively swollen with about fifteen spines on the undersurface (Text-fig. 4). The fore tibiae are curved at the base only. The third tarsal segments are short, the fourth cordate, the fifth longer and with the claws short, equal and each with a basal angle.

TABLE 1.
Various Measurements of Species of *Palpomyia*.

Legs.	<i>Palpomyia decima</i> .			<i>Palpomyia subalpino</i> .	
	Wing Length (holotype ♀) 2.76 mm.			Wing Length (paratype ♀) 2.96 mm.	
	Fore Leg (Paratype ♀).	Hind Leg (Paratype ♀).	Hind Leg (Allotype ♂).	Fore Leg (Paratype ♀).	Hind Leg (Paratype ♀).
Femur	0.714 mm.	1.020 mm.	0.850 mm.	0.822 mm.	1.222 mm.
Tibia	0.680 "	0.986 "	0.765 "	0.780 "	1.092 "
Tarsus I	0.323 "	0.544 "	0.408 "	0.416 "	0.650 "
" II	0.153 "	0.238 "	0.204 "	0.156 "	0.286 "
" III	0.085 "	0.119 "	0.102 "	0.091 "	0.130 "
" IV	0.076 "	0.085 "	0.068 "	0.078 "	0.078 "
" V	—	0.136 "	0.119 "	0.130 "	0.156 "
Claw	—	0.051 "	0.051 "	0.052 "	0.065 "

Wings: The venation is very similar to that of *P. decima* but the first radial cell is distinctly triangular, due to the two lower (posterior) sides being subequal. The anterior part of the wing membrane bounded by the costa, the base of the media and R_{4+5} is brownish.

Abdomen: This is very dark brown, almost black, shining, with no apparent gland rods.

The male is not known.

Distribution: Only known from the type locality.

PALPOMYIA CANTUARIS Ingram and Macfie.

INGRAM, A., and MACFIE, J. W. S., 1931.—*Ann. Trop. Med. and Parasit.*, 25: 207.

MACFIE, J. W. S., 1932.—*Ann. Trop. Med. and Parasit.*, 26: 50.

Type: Type female in British Museum (Natural History).

Type Locality: The first listed locality is South Canterbury, New Zealand.

Distribution: This species is recorded from South Canterbury, Ohakune, Wairakei and Lake Rotoroa, New Zealand.

PALPOMYIA NELSONI Macfie.

MACFIE, J. W. S., 1932.—*Ann. Trop. Med. and Parasit.*, 26: 50.

Types: Both male and female are described, but which sex is the holotype is not stated and the association of the sexes is said to be purely conjectural. In British Museum (Natural History).

Type Locality: Nelson, New Zealand.

Distribution: Nelson, Waiho and Aniseed Valley, New Zealand.

PALPOMYIA RASTELLIFER Macfie.

MACFIE, J. W. S., 1932.—*Ann. Trop. Med. and Parasit.*, 26: 51.

Types: Type female in British Museum (Natural History).

Type Locality: First listed locality is Lake Brunner, New Zealand.

Distribution: Recorded from Lake Brunner and Waiho, New Zealand.

PALPOMYIA URPICIFEMORIS Macfie.

MACFIE, J. W. S., 1932.—*Ann. Trop. Med. and Parasit.*, 26: 52.

Type: Type female in British Museum (Natural History).

Type Locality: Kaikoura, New Zealand. (Only recorded locality.)

Genus HETEROMYIA Say.

SAY, T., 1825.—*American Entomology*, 2: 79.

KIEFFER, J. J., 1906.—*Chironomidae in Wytzman's Genera Insectorum*, fasc. 42: 64.

See also—

EDWARDS, F. W., 1926.—*Trans. ent. Soc. Lond.*, 1926: 420.

MACFIE, J. W. S., 1940.—*Ann. Trop. Med. and Parasit.*, 34: 27.

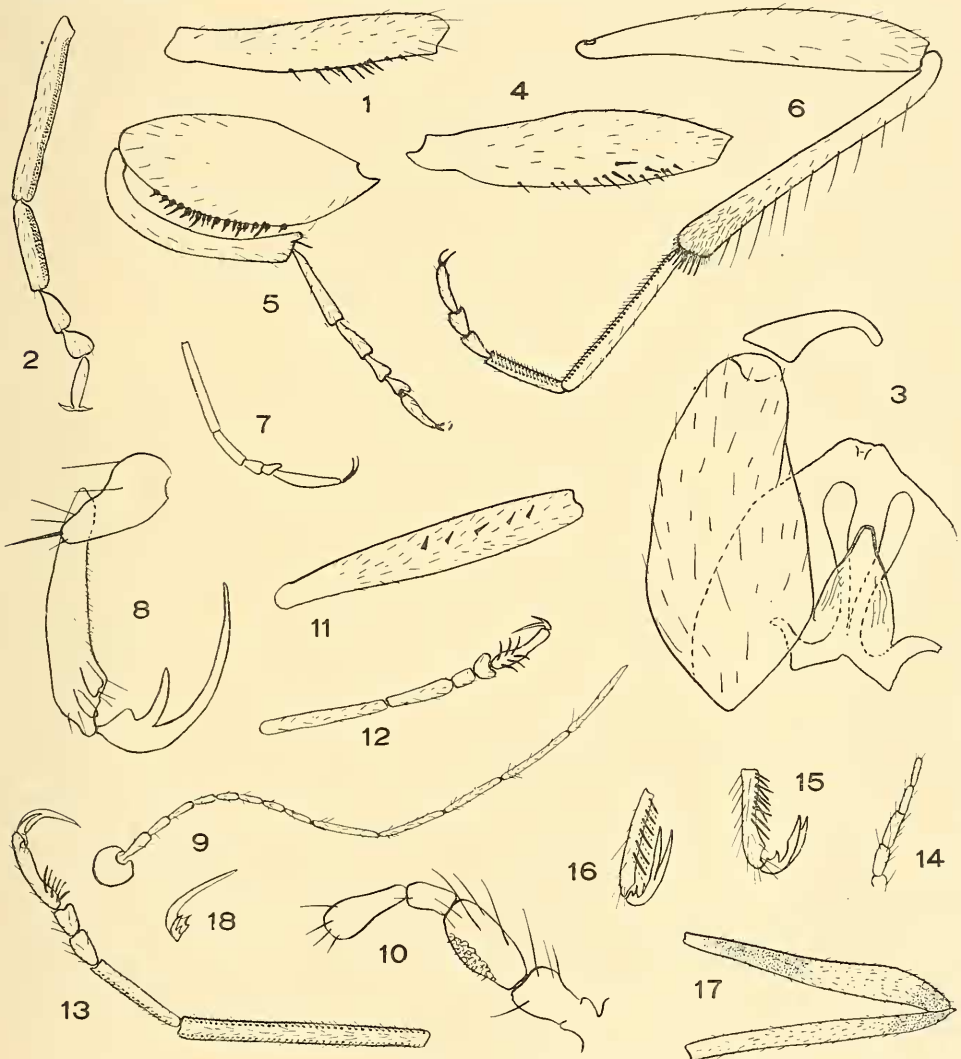
JOHANNSEN, O. A., 1943.—*Ann. ent. Soc. Amer.*, 36: 774.

Synonymy: *Pachyleptus* Walker, 1856 (vide Macfie, 1940).

Genotype: *Heteromyia fasciata* Say.

GENERIC CHARACTERS.

This genus is undoubtedly close to *Palpomylia* and is indeed included in *Palpomylia* by some authors, e.g., Edwards (1926). The chief points of difference are as follows.



Text-figures 1-17.—Various structures of species of the *Palpomylia* Group.

Figs. 1-3, *Palpomylia decima*. 1. Fore femur, $\times 52$. 2. Hind tarsus, $\times 52$. 3. Genitalia, $\times 193$. Fig. 4. Fore femur of *Palpomylia subalpina*, $\times 52$. Figs. 5-6, *Heteromyia tasmanica*. 5. Fore leg, $\times 52$. 6. Hind leg, $\times 52$. Figs. 7-8, *Clinohoelea tasmaniensis*. 7. Fore tarsus, $\times 38$ (swelling of fifth tarsal segment not so obvious in lateral view). 8. Last two segments of hind tarsus, $\times 193$. Figs. 9-13, *Xenohoelea tonnoiri*. 9. Antenna, $\times 52$ (basal segment omitted). 10. Palpus, $\times 193$. 11. Fore femur, $\times 52$. 12. Fore tarsus, $\times 52$. 13. Hind tarsus, $\times 52$. Figs. 14-15, *Johannsenomyia australiensis*. 14. Palpus, $\times 52$. 15. Fifth tarsal segment, $\times 52$. Figs. 16-18, *Dicrohelea lalokiensis*. 16. Fifth tarsal segment of fore leg, $\times 52$. 17. Hind femur and tibia, $\times 20$ (unstippled areas yellow). 18. Fifth tarsal segment of hind leg, $\times 52$.

The femora of the fore legs are greatly swollen and armed with spines and the fore tibiae are curved to the shape of the femora. The extremities of the hind femora are distinctly clubbed in both sexes and the fourth tarsal segments on all legs of the male and on the anterior four of the female are cordate. The hind legs of the female are very long with a single long basally barbed claw but those of the anterior four legs are equal and barbed; the claws of the male are small and equal.

It is obvious that, in assigning species to *Heteromyia*, Kieffer has regarded the form of the fore femora and tibiae as of greatest importance and at times disregarded tarsal characters. This was apparently done when Kieffer described *H. brevivirba*. As I have not examined specimens of this species I feel it should be retained in *Heteromyia* until it can be studied in detail and its true generic position established. Similarly another species, *H. tasmanica*, has been included in this genus although it again does not agree with the genotype in tarsal characters but is more likely to be confused with *H. brevivirba* than with any other Australasian species in the *Palpomyia* group.

For the present then, we have two species in the genus *Heteromyia* which are similar in the character of their fore femora and tibiae but which are dissimilar in tarsi and claws; nor does either species agree with the circumscription of the genus in tarsal or unguinal characters.

If one disregards the fore femora *H. brevivirba* would probably fit into *Homohalea* Kieffer 1917 and *H. tasmanica* would certainly be regarded as a *Palpomyia*.

HETEROMYIA BREVIVIRBA Kieffer.

KIEFFER, J. J., 1917.—*Ann. Nat. Mus. Hung.*, 15: 192.

Type: Type ♀, presumably in National Museum of Hungary, Budapest.

Type Locality: Brisbane, Queensland.

Translation of Original Description.

"♀. Black. Eyes glabrous, separated by a triangular shining space. Palpi long, second and fourth segments very short, twice as long as wide, third and fifth long. Antennae brownish black, scape and base of the eight following segments reddish-brown, segments 11-15 filiform, together twice as long as segments 3-10 together, each more than three times as long as 10, without verticils, but with sparse hairs, 4-10 cylindrical, at least twice as long as wide, with short verticils, not longer or scarcely longer than the segment. Thorax convex, higher than long, armed with a spinule at the middle of the anterior border. Mesonotum shining and glabrous. Halteres brownish black, stem pale. Wings hyaline, all the veins black, base gradually narrowing, R_{4+5} reaching at least the distal third of the wing, not passed by the costa, twice as long as R_1 , first radial cell linear, three times as long as wide, R_s very oblique, not longer than r-m, the latter perpendicular, bifurcation of M proximal to r-m, posterior branch strongly curved, curved proximally from below, distally from above, base of Cu_1 on M_{3+4} under r-m, anal vein bifurcated, intercalary fork absent. Legs dull brown, anterior femur black, two first segments of all the tarsi whitish, anterior femur very strongly thickened, armed ventrally with numerous spinules, anterior tibia curved, a little shorter than the femur and applied to it, the other four femora are long and not thickened, with one spinule in the distal third, the two posterior are feebly swollen distally into a club, posterior tibia with hairs dorsally aligned, posterior tarsus a little longer than the tibia, its first segment twice as long as the second segment, third segment scarcely as long as wide, weakly enlarged distally, fourth larger, transverse, cordiform, fifth a little longer than the third and fourth together, scarcely shorter than the second, thin, with five pairs of cylindrical black spinules; claws long, equal, attaining at least half the length of the segment, tarsi of the four other legs of the same conformation, save that in the anterior tarsus the third segment is cordiform like the fourth, the second a little shorter than the fifth, the first tarsal segment not twice as long as the following segment. Abdomen flattened, as large as the thorax, first tergite with a reddish spot. Length 3 mm."

Distribution: No further records of this species are available.

HETEROMYIA TASMANICA, n. sp.

Type: Holotype ♀ in the C.S.I.R. Museum.

Type Locality: Eaglehawk Neck, Tasmania (22: xi: 1922, A. Tonnoir).

DISTINCTIVE CHARACTERS.

A uniformly very dark brown species with very strongly swollen fore femora bearing spines on the undersurface, curved fore tibiae and fifth tarsal segments without spinules.

TABLE 2.
Various Measurements of Species of Heteromyia and Clinohoelea.

Legs.	<i>Heteromyia tasmanica</i> (Holotype).		<i>Clinohoelea tasmaniensis</i> (Holotype).	
	Wing length: 2.35 mm.		Wing length: 2.42 mm.	
	Fore Leg.	Hind Leg.	Fore Leg.	Hind Leg.
Femur	0.650 mm.	0.875 mm.	0.816 mm.	1.275 mm.
Tibia	0.540 "	0.825 "	0.765 "	1.190 "
Tarsus I	0.200 "	0.450 "	0.340 "	0.590 "
" II	0.105 "	0.200 "	0.153 "	0.272 "
" III	0.070 "	0.075 "	0.077 "	0.119 "
" IV	0.060 "	0.060 "	0.068 "	0.102 "
" V	0.105 "	0.125 "	0.221 "	0.170 "
Claw	0.050 "	0.050 "	0.102 "	0.136 "

DESCRIPTION.

(See Table 2 for measurements.)

Female.

Head: The head is very dark brown, bare except for dark orbital bristles and with the eyes narrowly separated. The antennae are dark brown with the first eight flagellar segments cylindrical and subequal and the last five also cylindrical but considerably longer, each being about twice the length of segment 10. The segments of the palpi are subcylindrical, the third being the longest and the mouthparts are less than half the height of the head.

Thorax: This is uniformly very dark brown and largely clothed with a pale grey pubescence. There is no anterior tubercle and the scutum has a sparse covering of very short black hairs largely arranged in longitudinal rows. The scutellum and postnotum are of the same colour as the rest of the thorax and the halteres have the stem brown and knob dark brown.

Legs: These are slightly lighter brown than the thorax with a reddish tinge and the first tarsal segments are lighter than the rest of the legs. The fore femora are greatly swollen (see Text-fig. 5) with stout spines on the underside for the distal two-thirds. The fore tibia is strongly arched to fit the outline of the femur. The fourth tarsus is cordate on all legs and the claws are equal and about half the length of the fifth segment. The mid and hind legs are unmodified (see Text-fig. 6).

Wings: The wings are covered with microtrichia but no macrotrichia are present. The costa extends about two-thirds of the wing length and the radial cells are well developed, the second being a little more than twice the length of the first. M is sessile.

Abdomen: This is dark brown. There are two spermathecae, the largest almost twice the size of the smaller, each with a short chitinized duct.

The male is unknown.

Distribution: Only known from the type locality.

Genus CLINOHELEA Kieffer.

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 295 and 316.

EDWARDS, F. W., 1926.—*Trans. ent. Soc. Lond.*, 1926: 413.

Genotype (by original designation): *C. unimaculata* (Macq.).

GENERIC CHARACTERS.

This genus differs from *Palpomyia* in the following points: The fifth tarsal segments of the fore legs (in both sexes) are considerably swollen. The fourth tarsal segments (at least on the four posterior legs) are deeply bilobed and each lobe terminates in one or more stout black spines (again in both sexes). In the female the claws of the

anterior four legs may be equal or unequal but those of the hind legs are large and unequal. [Edwards (1926) mentions several other characters for this genus which are not mentioned by Kieffer in his original diagnosis and which do not apply to the Australasian species and to at least some of the species originally put into this genus by Kieffer. Hence such characters have been omitted from this diagnosis.]

Key to Australasian Species of Clinohelca.

1. Wings with two transverse brown bands; anterior femora with four spinules on their distal halves; claws of female unequal on all legs *bifasciata* (K.)
Wings unmarked; anterior femora without spinules 2
2. Claws of female equal on four anterior legs, unequal on hind legs; femora and tibiae with yellow preapical bands *tenuissima* (K.)
Claws of female equal on two anterior legs, unequal on mid and hind legs; femora and tibiae without yellow preapical bands *tasmaniensis* n. sp.

CLINOHELEA TENUISSIMA (Kieffer).

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 195. (*Sphaeromyias*.)

———, 1917.—*Ibid.*, 15: 316. (*Clinohelca*.)

Type: Type female presumably in National Museum of Hungary, Budapest.

Type Locality: Yomba, New Guinea.

Synonymy: *Sphaeromyias tenuissima*, Kieffer, 1917, loc. cit.

Translation of Original Description.

"♀. Black, slight and slender. Head dull reddish-brown, scarcely transverse seen from in front. Front of head and mouth-parts reddish-yellow, the latter half as long as the height of the head. Eyes separated by a linear space equalling their terminal breadth. Palpi whitish, fifth segment obtuse, longer than the fourth, with several long hairs, shorter than the third. Antennae very long and very slender, distinctly longer than the body, scape reddish-yellow, segments 3-10 whitish, 11-15 brown, the third cylindrical, twice as long as the fourth, 4-10 subcylindrical, more than four times as long as wide, 11-15 together as long as 3-10 together, filiform, each two to three times as long as 10. Thorax brilliant, glabrous, as high as long, a little convex, with a spinule at the middle of the anterior border. Halteres whitish. Wings subhyaline, scarcely lobed, veins brownish-black, R_{4+5} curved, bordering close to the wing apex, closer to the latter than M_3 , three times as long as R_1 ; first radial cell two to three times as long as wide, base of R_{4+5} very oblique, longer than r-m, the latter perpendicular; bifurcation of M proximal to r-m, situated above the base of Cu_1 on M_{3+4} . Legs slender and long, brownish-black, tarsi whitish; fore leg pale yellow, distal extremity of femur black, tibia brown with a large yellow ring before the distal extremity, the four posterior femora with a yellow ring before their distal extremities, the four posterior tibiae with a larger yellow ring distally, tarsi a little longer than the tibiae, first hind tarsus more than twice the length of the second, third segment at least twice as long as wide, fourth black in all tarsi, transverse, prolonged ventrally into two lobes which terminate in a long cylindrical black spinule, fifth segment inermous, curved, longer than the third and fourth together, strongly enlarged on the anterior tarsi, claws of all tarsi large, almost two-thirds the length of the segment, in the four anterior legs they are equal, in the two posterior legs unequal, the one slightly greater than the other. Abdomen brownish black, much more slender than the thorax, lamellae white. Length 2.5 mm."

Distribution: This species has not yet been rediscovered.

CLINOHELEA BIFASCIATA (Kieffer).

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 194 (*Palpomyia*).

———, 1917.—*Ibid.*, 15: 316 (*Clinohelca*).

Type: Type female presumably in National Museum of Hungary, Budapest.

Type Locality: Brisbane, Queensland.

Synonymy: *Palpomyia bifasciata*, Kieffer, 1917, loc. cit.

Translation of Original Description.

"♀. Black, dull, glabrous. Vertex reddish-brown. Eyes glabrous, confluent at the vertex. Palpi long, fifth segment the longest. Antennae brownish-black, segments 3-10 reddish-brown at their bases, subcylindrical, scarcely narrowed in their distal part, 4-10 at least twice as long as wide, segments 11-15 together longer than 3-10 together, filiform, each more than twice as long as 10. Thorax higher than long, convex, with a spine at the middle of the anterior border. Scutellum reddish-brown. Halteres reddish-yellow. Wings whitish, with two transverse brown bands, of which the first extends from the anterior border to the base of Cu_1 , covering all the radius and r-m, the second joining the origin of R_{4+5} to M; R_{4+5} not passed by M_{3+4} , almost three times as long as R_1 , almost reaching the distal fifth of the wing, its base very oblique, scarcely longer than r-m, the latter perpendicular, first radial cell twice as long as wide, bifurcation of M proximal to r-m, which is also the case for the origin of Cu_1 on M_{3+4} , intercalary fork absent. Legs brown or dark brown, anterior legs with the tibiae and the other

four legs with the trochanters, the distal extremities of the femora and the tarsi a yellowish or reddish-brown; femora not enlarged, the anterior with four spinules on the distal half, the other four inermous, the two posterior legs longer than the other four, third tarsal segment transverse, in the posterior tarsi almost transverse, cordiform, the fourth transverse, cordiform, prolonged ventrally in two lobes directed forwards and each terminating in a long cylindrical black spinule; fifth segment longer than the preceding two together, inermous, in the anterior tarsi it is strongly swollen at its base; claws on all the tarsi unequal, the larger attaining two-thirds of the segment, almost three times as long as the smaller. Tergites II-V having on their posterior halves a transverse reddish-yellow band, prolonged anteriorly at the middle. Length 4 mm."

Distribution: This species has not yet been rediscovered.

CLINOHELEA TASMANIENSIS, n. sp.

Types: Holotype ♀ and one paratype ♀ in the C.S.I.R. Museum, together with a damaged but conspecific ♂ specimen.

Type Locality: National Park, Tasmania (16:xii:1922, A. Tonnoir). Paratype from Geeveston, Tasmania (7:xii:1922, A. Tonnoir).

DISTINCTIVE CHARACTERS.

A shining, dark brown species with pale whitish halteres and pale trochanters, bases of femora and first and second tarsal segments. The lack of yellow rings on femora and tibiae will distinguish this species from *C. tenuissima*.

DESCRIPTION.

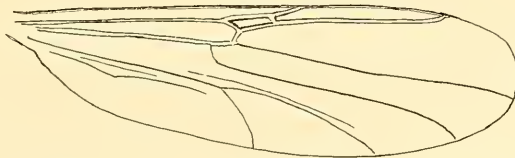
(See Table 2 for measurements.)

Female.

Head: The head is almost black, shining with the eyes rather widely separated and the mouthparts about half the height of the head. The antennae are fairly dark brown with the basal flagellar segments cylindrical and the last five elongated.

Thorax: The scutum is dark brown and shining with a very small anterior tubercle. The scutellum is not pubescent but a few border bristles are present. The halteres are whitish.

Legs: The legs are slightly lighter than the thorax with the trochanters, bases of the femora, and the first two segments of the tarsi pale brown. The femora are unmodified, the tarsi have the third segment short, the fourth bilobed, and the fifth elongate and in the fore legs this is distinctly swollen (see Text-figs. 7 and 8). The claws of the fore legs are equal, those of the mid and hind legs unequal.



Text-fig. 19.—Wing of *Clinohoelea tasmaniensis* (from holotype), × 28.

Wings: Macrotrichia are absent and the microtrichia are very fine, being barely visible at 60 ×. Text-fig. 19 illustrates the venation.

Abdomen: This is dark brown with two subequal spermathecae.

Male. The male specimen (with same collection data as the holotype) agrees in all details of colouration, but unfortunately the antennae, genitalia and fore legs are missing. However, the claws of the mid legs are equal.

Distribution: Only known from the localities listed above.

Genus XENOHELEA Kieffer.

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 295.

MACFIE, J. W. S., 1940.—*Ann. Trop. Med. and Parasit.*, 34: 28.

Synonymy: *Mixohoelea* Kieffer, J. J., 1917. *Ann. Mus. Nat. Hung.*, 15: 364.

Genotype: *X. pruinosa* Kieffer, loc. cit. and 1918. *Ann. Mus. Nat. Hung.*, 16: 96. (By original designation.)

GENERIC CHARACTERS.

The genus has most of the characters of *Palpomyia* but the claws are unequal and simple on all legs (equal in *Palpomyia*) and the fifth tarsal segments are armed with batonnets. The eyes are rather more closely approximated than in *Palpomyia*.

Key to Australasian Species of Xenohoelea.

- R₄₊₅ terminating distal to level of end of M₂ *australiensis* (K.)
- R₄₊₅ terminating proximal to level of end of M₂ *tonnoiri* n. sp.

XENOHELEA AUSTRALIENSIS (Kieffer).

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 364 (*Mixohoelea*).

———, 1917.—*Ibid.*, 15: 194 (*Palpomyia imparunguis*).

Type: Holotype ♀ (*Palpomyia imparunguis* K. non Becker), presumably in National Museum of Hungary, Budapest.

Type Locality: Moroka, New Guinea (1,300 m.).

Synonymy: *Mixohoelea australiensis* Kieffer loc. cit. *Palpomyia imparunguis* Kieffer loc. cit. The latter name is preoccupied by *P. imparunguis* Becker.

Translation of Original Description.

“♀. Brownish black, brilliant, glabrous. Eyes almost confluent at the vertex, separated posteriorly by a triangular space, anteriorly by a very fine line. Antennae reddish-brown, segments 11-15 brownish black, together distinctly longer than 3-10 together, filiform, each three times as long as 10, with a basal verticel of hairs longer than the other hairs, segments 4-10 subcylindrical, almost twice as long as wide. Thorax higher than long with a spinule at the middle of the anterior border. Stem of halteres pale. Wings subhyaline, strongly lobed at the base, veins brown, R₄₊₅ terminating close to the wing apex, closer than M₂, 2.5 times as long as R₁, first radial cell two to three times as long as wide, base of R₄₊₅ very oblique, a little longer than r-m, the latter almost perpendicular, bifurcation of median fork proximal to r-m, base of Cu₁ still more proximal. Legs brown, the first two tarsal segments lighter, the two hind legs longer than the other four, femora not enlarged, the anterior with four spinules on its distal half, the other four inermous, posterior tarsus a little longer than the tibia, third segment of all the tarsi not or scarcely as long as wide, fourth transverse, cordate, but not prolonged into two lobes, fifth longer than the two preceding together, equal to the second, slender, curved, fortified on its distal half with three pairs of cylindrical black spinules; claws unequal, the larger one equalling two-thirds of the segment, at least twice as long as the smaller, each with a small basal angle. Length 3 mm.”

Distribution: This species has not yet been rediscovered.

XENOHELEA TONNOIRI, n. sp.

Types: Holotype ♀ and one ♀ paratype in the C.S.I.R. Museum.

Type Locality: Advent Bay, Tasmania (8 : xii: 1922, A. Tonnoir). Paratype from Geeveston, Tasmania (7 : xii: 1922, A. Tonnoir).

TABLE 3.
Various Measurements of Species of Xenohoelea and Johannsenomyia.

	<i>Xenohoelea tonnoiri</i> (Paratype ♀).		<i>Johannsenomyia australiensis</i> (Paratype ♀).	
	Wing Length, 2.47 mm.		Wing Length, 4.24 mm.	
Legs.	Hind Leg.	Hind Leg.	Hind Leg of Small Specimen. (See note in text.)	
Femur	1.248 mm.	—	—	
Tibia	1.066 ”	1.590 mm.	0.954 mm.	
Tarsus I	0.624 ”	1.060 ”	0.583 ”	
” II	0.260 ”	0.398 ”	0.239 ”	
” III	0.091 ”	0.239 ”	0.159 ”	
” IV	0.052 ”	0.106 ”	0.079 ”	
” V	0.208 ”	0.265 ”	0.159 ”	
Claw	0.156 ”	0.159 ”	0.106 ”	

DISTINCTIVE CHARACTERS.

This species should be easily differentiated from *X. australiensis* by the position of the end of R_{4+5} in relation to that of M_2 as detailed in the key.

DESCRIPTION.

(See Table 3 for measurements.)

Female.

Head: The head is black and shining with eyes separated dorsally. The clypeus is prominent, black and shining and the mouthparts are very short, less than half as long as the height of the head. The palpi (see Text-fig. 10) have the sensory areas of the third segments comprising many small pits. The antennae (see Text-fig. 9) are dark brown, the first eight flagellar segments are cylindrical and the last five elongated and cylindrical.

Thorax: The thorax is the same colour as the head. There is a small anterior tubercle on the anterior margin of the scutum and the latter is clothed with brown pubescent hairs. The pleura are shining or if viewed obliquely appear covered with a fine, greyish bloom. The scutellum is covered with brown pubescent hairs and a few dark brown border bristles and the halteres are dark brown with lighter brown stems.

Legs: The coxae are reddish-brown to dark brown, the femora and tibiae dark brown, shining and the fore femora (Text-fig. 11) have five or six short strong spines on the undersurface. The first two tarsal segments are yellowish, but the third to fifth segments are dark brown. The fourth tarsal segments are cordate, the bases of the fifth segments are armed ventrally with a group of six strong spinules. The tarsal claws are single, curved and each with a basal tooth, the major branch being about two-thirds the length of the fifth segment (see Text-fig. 12 for illustration of fore tarsus and Text-fig. 13 for hind tarsus).

Wings: Microtrichia are present over the wing surface but macrotrichia are absent. The venation is shown in the photograph (Plate v, fig. 3).

Abdomen: The abdomen is dark brown but rather dull and there are two subequal spermathecae.

Distribution: Apart from the specimens from Tasmania listed above I have before me a series of eight specimens from the vicinity of Canberra (Blundell's, A.C.T., 7:i:1930, A. Tonnoir; Blundell's, A.C.T., 15:iii:1930, L. F. Graham), two of which agree quite well with the holotype but are a little smaller, and the rest are very similar, the only apparent differences being their slightly smaller size and the colouration of the femora and tibiae. Instead of being uniformly dark brown the fore and mid femora are reddish-brown and only very dark at the apex and the hind femora are dark near the base and the apex with a central reddish-brown area. The tibiae are also reddish-brown and only very dark at the base and the apex in the fore and hind tibiae, the latter particularly. In this group I am loath to place any reliance on small size differences and the fact that the Canberra series is not constant in colouration makes it advisable to consider these specimens, for the present at least, as *X. tonnoiri*.

Genus JOHANNSENOMYIA Malloch.

MALLOCH, J. R., 1915.—*Bull. Illin. State Lab.*, 10: 332.

EDWARDS, F. W., 1926.—*Trans. ent. Soc. Lond.*, 1926: 413.

Synonymy: *Johannseniella* auct. partim; *Sphaeromyias*, Kieffer nec Curtis (see Macfie, 1940).

Genotype: I have not been able to discover what species constitutes the genotype of *Johannsenomyia*.

GENERIC CHARACTERS.

Johannsenomyia is similar to *Palpomyia* except that there is no trace of an anterior tubercle; all the femora are unarmed; the fifth tarsal segments of the female have two rows of batonnets on the undersurface and the claws of the female are equal with a large tooth at the base of each.

Only one species from Australia can as yet be ascribed to this genus.

JOHANNSENOMYIA AUSTRALIENSIS, n. sp.

Types: Holotype ♀ and three ♀ paratypes in the C.S.I.R. Museum.

Type Locality: Cotter River, Australian Capital Territory (14:xii:1929, A. Tonnoir).

DESCRIPTION.

(See Table 3 for measurements.)

Female.

Head: The head is black, the eyes are divided and the clypeus is large and prominent, black and shining. The length of the mouthparts is little more than half the height of the head. The pedicels and the basal halves of the third segments of the antennae are brown, the rest dark brown. The first flagellar segment is twice as long as the following seven segments, all are elongated and slightly tapered distally; the last five segments are more elongated, each being about twice the length of segment 10. The verticils are short, not dense. The palpus is illustrated in Text-fig. 14.

Thorax: This is uniformly black. There is no anterior tubercle or spine and the scutum is shiny and sparsely pubescent. The scutellum is black and shining and the halteres are black with dark brown stems.

Legs: The femora and tibiae are very dark brown, the tarsi rather reddish-brown. The fore femora are not swollen or spinose. The fourth segments of the tarsi are small and the fifth armed with blunt spines (see Text-fig. 15). The claws are fairly long, about two-thirds the length of the fifth segment, equal and each with a small basal tooth.

Wings: Macrotrichia are absent but microtrichia are present over the whole surface. The venation is illustrated in the photograph in Plate v, fig. 2.

Abdomen: This is very dark brown, without gland rods and with three spermathecae, the dimensions of which are $85\mu \times 75\mu$, $80\mu \times 65\mu$ and $25\mu \times 25\mu$, the last having a duct 10μ long.

Distribution: This species is only known from the type locality. Note: Apart from the specimens listed as types there are three other females with exactly the same collection data which agree with the holotype in all respects except size. These specimens are distinctly smaller (e.g., the wing length is 2.4 mm. as compared with 4.2 in the holotype). Nevertheless I feel that they must still be considered to be *J. australiensis*.

Genus DICROHELEA Kieffer.

KIEFFER, J. J., 1917.—*Ann. Mus. Nat. Hung.*, 15: 363.

MACFIE, J. W. S., 1940.—*Ann. Trop. Med. and Parasit.*, 34: 27.

Genotype: *D. filicornis* (Kieffer). Originally described by Kieffer in *Palpomyia* (Kieffer, 1910, p. 196). Of the five species originally placed in this genus by Kieffer, *D. filicornis* is the first mentioned and has been accepted by Macfie (1940) as the genotype.

GENERIC CHARACTERS.

This genus is closely related to *Palpomyia*, differing particularly in the tarsi. The claws of the fore legs are equal and bifid, the median tooth being very long and the lateral tooth very short. On the four posterior legs the claws are unequal and bifid, one with the median tooth very long and the lateral tooth very short, the other with the median tooth short and the lateral tooth very short. The fourth tarsal segments are cylindrical, not cordiform and the fifth tarsal segments are armed with black batonnets.

Only one species has so far been found in the Australasian Region.

TABLE 4.
Various Measurements of Dicrohelea lalokiensis.
Wing length, 3.23 mm.

Antenna.		Legs.	Fore Leg.	Hind Leg.
Segment	3 ..	Femur.	1.219 mm.	1.855 mm.
Segments	4-10, each	Tibia.	1.272 "	1.749 "
Segment	11 ..	Tarsus I.	0.530 "	1.370 "
"	12 ..	" II.	0.265 "	0.424 "
"	13 ..	" III.	0.137 "	0.212 "
"	14 ..	" IV.	0.080 "	0.159 "
"	15 ..	" V.	0.318 "	0.292 "
		Claw.	0.212 "	0.265 "

DICROHELEA LALOKIENSIS, n. sp.

Types: Holotype ♀ and two ♀ paratypes in the C.S.I.R. Museum, Canberra, A.C.T.

Type Locality: All three specimens were taken on the bank of the Laloki River, at the foot of the pass to Sogeri, Papua (2:vi:47, D. J. Lee).

DISTINCTIVE CHARACTERS.

Until other species of this genus are found in the region the distinctive characters remain those of the genus itself.

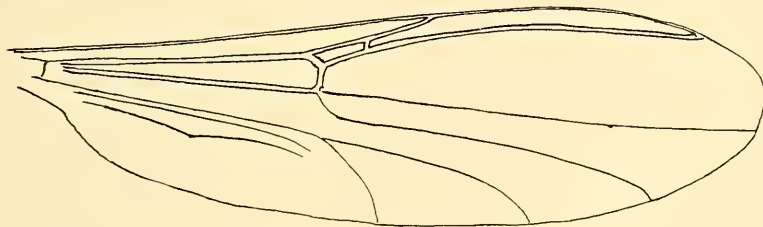
Description: Female. (See Table 4 for measurements.)

A large shining black species with partly yellow head and some yellow markings on legs.

Head: This is brown dorsally but the clypeus and mouthparts are yellow and the palpi brown. The antennae have light brown pedicels, segments 3-10 are yellowish with a narrow dark ring at their apices and segments 11-15 are brown. Segment 3 is longer than 4, all flagellar segments are cylindrical but 11-15 are greatly lengthened. The eyes are narrowly but distinctly separated.

Thorax: An anterior tubercle is present on the scutum. The thorax is entirely shining black except for yellow-brown pronotal lobes and similar fore coxæ although on these the upper anterior surface is darker brown. The halteres are black with the basal part of the stem whitish.

Legs: There are no spines on the femora but the posterior pair are swollen preapically. The anterior femora are yellow except for a brownish base and a narrow black apex, the mid and hind femora (Text-fig. 17) are black for the basal half, then there is a broad yellow band followed by a black apex. (In the paratypes the yellowish colouration is restricted in varying degree but in the darkest specimen a narrow preapical yellowish band is still present.) The basal fourth of the tibiae is black, the rest yellow. (In the other specimens this varies to almost entirely black but the apex is still yellow.) The first and second tarsal segments are yellow with a narrow dark apex, the third is pale at the base, the rest brown, the fourth and fifth are brown and the claws black. Tarsus 4 is shorter in the four anterior legs than in the hind legs and tarsus 5 is elongate with about seven pairs of strong, black spinules. The claws are equal and toothed on the fore-legs (Text-fig. 16) and very unequal and toothed on the four posterior legs (Text-fig. 18).



Text-fig. 20.—Wing of *Dicrohelea lalokiensis* (from holotype), $\times 30$.

Wings: These are hyaline, macrotrichia are absent and microtrichia cannot be seen at $\times 60$. The costa, the radius, the base of M and r-m are strong and brown, the rest of the veins are weaker and pale. The costa and R_{4+5} terminate beyond the level of the end of M_2 . There are two radial cells, the second being very long and M_2 is scarcely sessile. The venation is illustrated in Text-fig. 20.

Abdomen: This is long, narrow, and shining black.

Male Genitalia: Attached to the female type were found the genitalia of a male broken off during copulation. They were removed and mounted with the holotype but were found to be rather too broken for accurate description. However, the mount will undoubtedly prove useful for comparison with any suspected males of this species which may be collected in the future.

Distribution: Only known from the type locality.

References.

Systematic references are cited in full in the text; for other general references not listed here see Part I of this series.

EXPLANATION OF PLATE V.

Photographs of wings of various species of the *Palpomyia* group. All $\times 25$.

1. *Palpomyia decima* (holotype). 2. *Johannsenomyia australiensis* (paratype). 3. *Xenohelea tonnoiri* (paratype).
